

New species of *Eupithecia* (Lepidoptera, Geometridae) from China, part I

V. MIRONOV¹⁾, A. C. GALSWORTHY²⁾ and D. XUE³⁾

¹⁾ Zoological Institute RAN, Universitetskaja nab., 1, RU-199034, Saint Petersburg, Russia

²⁾ The Natural History Museum, Cromwell Road, SW7 5BD, London, United Kingdom

³⁾ Institute of Zoology, Chinese Academy of Sciences,
19 Zhongguanlu, Haidian, Beijing, 100080 China

Abstract 12 new species of *Eupithecia* (Lepidoptera, Geometridae) are described from China.

Key words Revision, *Eupithecia amicula* sp. n., *Eupithecia honesta* sp. n., *Eupithecia albimedia* sp. n., *Eupithecia salubris* sp. n., *Eupithecia antiqua* sp. n., *Eupithecia tibetana* sp. n., *Eupithecia citraria* sp. n., *Eupithecia russula* sp. n., *Eupithecia brunneilutea* sp. n., *Eupithecia luctuosa* sp. n., *Eupithecia apta* sp. n. and *Eupithecia fortis* sp. n., *Eupithecia captiosa* Vojnits, 1984, *Eupithecia robiginascens* Prout, 1926, taxonomy.

Introduction

The genus *Eupithecia* is extremely species-rich in Asia, particularly in montane areas. In recent years detailed work has been published on species occurring in Far East Russia, Japan, Taiwan, Nepal and Borneo (Viidalepp & Mironov, 1988*a*, *b*, 1990; Inoue 1979, 1980, 1988, 1998, 2000; Holloway, 1997). However, the Chinese fauna remains poorly known, despite the considerable work done by Dr Vojnits of Budapest on this subject: over the past thirty years 114 species and 4 subspecies of *Eupithecia* were described as new from China by Vojnits (1972, 1973, 1974, 1976*a*, *b*, 1979*a*, *b*, 1980, 1981, 1982, 1984*a*, *b*) and Vojnits & De Laever (1974, 1978).

Much of this output has been based on the large collection of Chinese Geometridae made by H. Höne in the Zoologisches Forschungsinstitut und Museum Alexander Koenig (ZFMK, Bonn), some of which are now deposited in the Hungarian Natural History Museum (HNHM, Budapest). Unfortunately, most of these species were not illustrated, and the descriptions and genitalia drawings are difficult to follow, and, as it proved, in many cases inaccurate. Nor, hitherto, has much of the type material been available to researchers. This situation has now happily changed, in that most of the type material has been sorted and returned to its original institutions. As a result, we have been able to locate and examine almost all of the original type material used by Vojnits. We have also been able to examine material from China in the British Museum of Natural History (BMNH, London), and the extensive collection of the Zoological Institute of the Academy of Sciences of China (ZCAS, Beijing). This work is being carried out with a view to the eventual publication of a complete survey of *Eupithecia* in China.

In the course of this work we have discovered a substantial number of new species of *Eupithecia* in the Höne collection, and in the BMNH and ZCAS material. Rather than wait until the revision can be completed (a major task involving possibly some 300 species), we have decided to publish the new species separately in a series of papers, of which this is the first. Hopefully this may lead to the discovery of further material in other institutions, and to further collecting. There is much still to be discovered. In particular there is as yet no biological information available on these species, nor phenological data other than the scant information from the specimen labels.

In this paper twelve new Chinese *Eupithecia* species are described: *E. amacula* sp. n., *E. honesta* sp. n., *E. albimedia* sp. n., *E. salubris* sp. n., *E. antiqua* sp. n., *E. tibetana* sp. n., *E. citraria* sp. n., *E. russula* sp. n., *E. brunneilutea* sp. n., *E. luctuosa* sp. n., *E. apta* sp. n. and *E. fortis* sp. n. One species is downgraded to synonymy: *Eupithecia captiosa* Vojnits, 1984 becomes a junior synonym of *Eupithecia robiginascens* Prout, 1926.

We are grateful to Dr D. Stüning (ZFMK, Bonn) and Dr A. Hausmann for kind support of the authors when visiting respectively the Bonn Museum and the Zoologische Staatssammlungen, Munich; also to Dr L. Ronkay, Budapest, and his colleagues for their indefatigable labour in sorting out the Vojnits material. Thanks are also due to the Deutsche Forschung Gemeinschaft (DFG, grant No. 436 RUS 17/99/02) and the Russian Foundation for Basic Research (grant No. 01-04-49637) that enabled to Dr V. Mironov to do extensive studies of Chinese Eupitheciini in ZFMK (Bonn). Finally we are grateful to Dick Vane-Wright and Malcolm Scoble at BMNH for reading the manuscript and commenting helpfully.

***Eupithecia amacula* Mironov & Galsworthy, sp. nov. (Fig. 1)**

Description. Wingspan 18–20 mm; forewing 12 mm. Forewing ground colour pale grey-brown, with most veins, especially the lower border of the cell, picked out in darker brown. An undulating brown basal line. Postbasal and antemedian lines pale, and closely parallel, oblique for most of their length, with an angle close to the costa and meeting the costa at right angles. Median area clear grey-brown, crossed by an undulating double median line. Discal dot dark, elongated, bordered by a brown marking on the costa in the shape of a narrow segment of a circle. A pale postmedian fascia, crenellated proximally by dark markings on the veins, oblique and curving to an abrupt zigzag close to the costa. Terminal area slightly darker, crossed by an undulating pale subterminal line. Terminal line dark brown, fringes pale brown. Hindwing ground colour grey-white, with a small discal dot. Anal margin as far as discal area tinged with brown mottling. Terminal area pale brown, with two pale wavy subterminal lines. Fringes chequered brown and pale grey.

Male genitalia (Fig. 13). Uncus long and stout, possibly biapical. Valve large and broad, without ventral process. Vinculum short, rather broad with shallow medial hollow. Papillae on the anterior ends of labides large, elongate and narrow, covered with sparse setae. Aedeagus large but shorter than length of valve. Vesica armed with two horn-like cornuti (one long, sinuate and other smaller, bowed) and one thin elongate plate. Sternite A8 large, with two long, narrow, apically diverging, pointed and sclerotized rods; basal hollow shallow; apical hollow very deep, membranous.

Female genitalia (Fig. 16). Bursa copulatrix large, bipartite, mostly membranous, but its central part heavily sclerotized and irregularly covered with numerous spines ranging from small to large. Antrum membranous. Ductus seminalis not found (absent in slide). Colliculum absent. Tergite A8 elongate, slightly tapered to apex. Anterior and posterior apophyses long and thin. Papillae anales relatively small, short and narrow.

Range. South west and west China. Known from Sichuan, Yunnan and Shaanxi.

Similar species. *E. amacula* sp. n. could be confused with *E. consortaria* Leech, 1897 described from Moupin (west China), but can be distinguished from it by the lighter ground colour and the well marked but soft pattern on the wings. The male genitalia are also similar to those of *E. consortaria*, but the new species has two horn-like cornuti on the vesica and the rods of sternite A8 are more apically divergent than in *E. consortaria*. The

female genitalia are allied to, but not identical with the female genitalia of *consortaria*.

Holotype. ♂, Pu-tsu-fang [Sichuan], 9820 ft, native collector, vi and vii 1890, Leech collection 1900-64, BM Geometrid slide no 3517 (BMNH). Paratypes. 1 ♂, label data as holotype (BMNH); 1 ♂, Yulongshan, Yunnan, 10. vii. 1962, coll Song Shimei, slide L-2679 (ZCAS). 1 ♂ 1 ♀, Tapaishan [Dabaishan], Tsinling [Qinling], South Shaanxi, ca 1,700 m, respectively 25. vii. and 4. viii. 1936, H. Höne, Vojnits slides nos 12393, 11483 (ZFMK).

Remarks. The female from Dabaishan detailed above was published by Vojnits (1979a) as the female of *Eupithecia infensa* Vojnits, but is not conspecific with the male holotype of that species, which belongs to the *satyrata* species-group.

***Eupithecia honesta* Mironov & Galsworthy, sp. nov. (Fig. 2)**

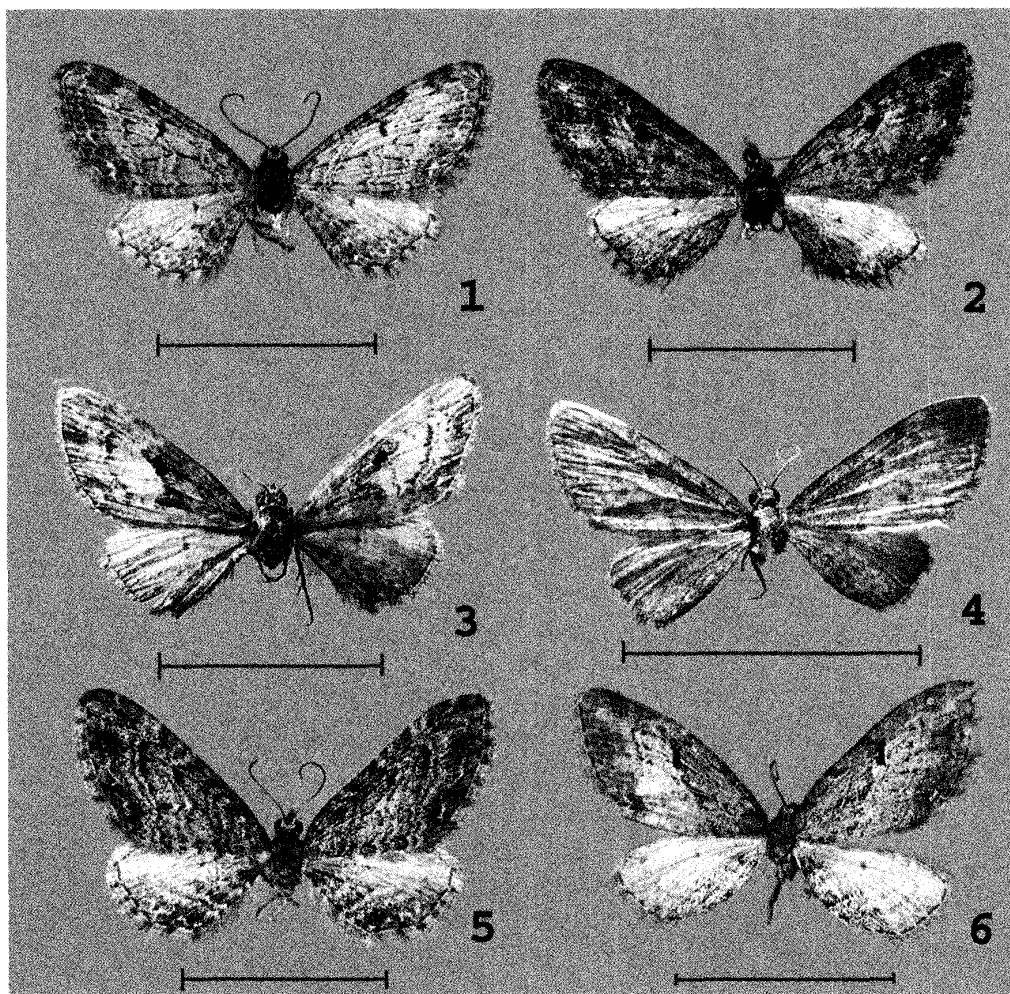
Description. Wingspan 19–22 mm; forewing 14 mm. Forewing ground colour pale orange brown. Basal area mid-brown, this colouration extending as far as the median line. An indistinct brown basal line. Antemedian largely obscure, when visible consisting of a pale oblique double line, with a double angle below the discal space. Median line consisting of a dark edge to the darker basal area, passing through the discal dot, angled outwards near the costal and inner margins and inwards on lower edge of cell, the latter vein strongly picked out in dark brown. Discal dot large, rather square. Outer half of median fascia clear orange brown from R_5 to CuA_2 , presenting a rather square pale spot on the outer edge and below the discal spot. Postmedian a thick brown line, sharply angled towards the costa at vein R_5 , paralleled on the outer side by a pale line. Terminal area slightly darker brown, crossed by a wavy white subterminal line. Terminal line dark brown. Fringes chequered light and dark brown. Hindwing ground colour white, with a minute discal dot. Anal margin as far as discal area with brown mottling. Terminal area brown, crossed by a single zigzag pale line.

Male genitalia (Fig. 14). Uncus stout, very wide, biapical. Valve elongated, with parallel ventral and dorsal margins, a heavily sclerotized sacculus and a finger-like, sclerotized ventral process. Vinculum wide and stout, with shallow medial hollow. Papillae on anterior ends of labides large, elongated. Aedeagus slim. Vesica armed with one medium-sized horn-like cornutus, one elongated, U-shaped plate, tapered to apex, and one small, irregular plate near the ductus ejaculatorius base. Sternite A8 elongated, with shallow basal hollow and two very short and narrow, heavily sclerotized, apical arms with a very shallow hollow between them.

Female genitalia (Fig. 17). Bursa copulatrix globular, covered closely with spines. Ductus bursae elongated, weakly sclerotized with a large U-shaped heavily sclerotized blotch near its base. Ductus seminalis broadened at base, attached to median part of ductus bursae. Colliculum collar-like, small, short and narrow. Tergite A8 trapezoid. Anterior and posterior apophyses short and thin, tapered. Papillae anales short and broad.

Range. Known only from the mountains on the borders of Tibet and Yunnan.

Similar species. This species belongs to the *lariciata* species-group. Similar to *E. lariciata* (Freyer, 1841), but can be distinguished from it by the larger, ovate discal spots, the presence of reddish spots near the discal spots on the forewings and lighter, whitish hindwings. The male genitalia are distinguished from the genitalia of *E. lariciata* by a more elongate valve with a larger ventral process and a larger horn-like cornutus on the vesica. The female genitalia of the new species are easily distinguished from those of *E. lariciata* by the heavily sclerotized diverticulum at the base of the ductus bursae and the

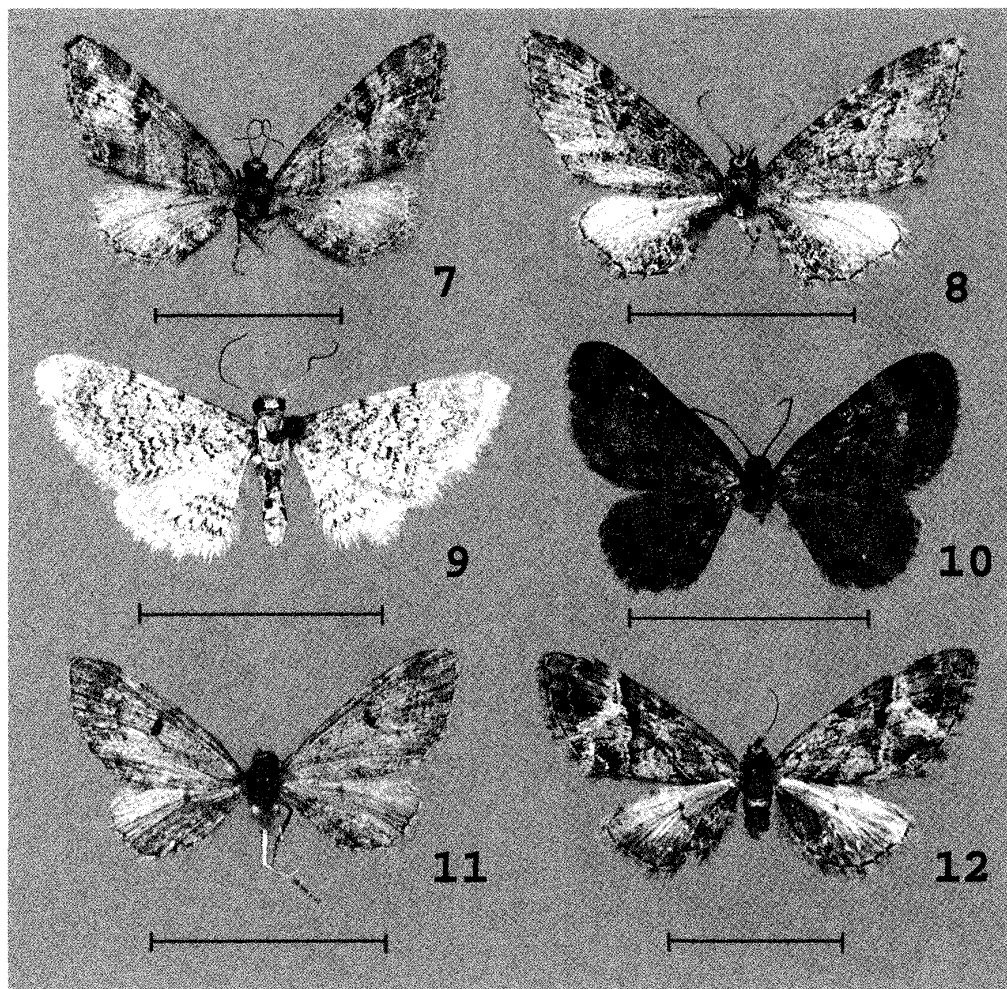


Figs 1-6. *Eupithecia* adults. 1. *E. amicula* sp. nov. 2. *E. honesta* sp. nov. 3. *E. albimedia* sp. nov. 4. *E. salubris* sp. nov. 5. *E. antiqua* sp. nov. 6. *E. tibetana* sp. nov.

narrow collar-like colliculum.

Holotype. ♂, eastern frontier of Tibet, native collectors of P Dejean, 1905, Oberthür collection 1927-3 (BMNH), BM Geometrid slide no 1950-589. **Paratypes.** 1 ♂, Likiang [Lijiang], Yunnan, 1. vii. 1935, 2 ♀, 20. vii. and 30. vii. 1935, H. Höne, respectively De Laever slides nos 270, 245, 264; 1 ♀, A-tun-tse [Deqing], Yunnan, Talsohle ca 3,000 m, 21. vi. 1937, H. Höne, Vojnits slide no 14189 (ZFMK); 1 ♀, Zhongdian, Yunnan, 3,150 m, 6. viii. 1981, Liao Suxiang, Geometrid slide no L-2629 (ZCAS).

Remarks. The female paratype from Deqing referred to above was published by Vojnits (1984a) as the female of *Eupithecia captiosa* Vojnits. It does not however belong to the same species as the male holotype of *E. captiosa*, which is conspecific with *Eupithecia robiginascens* Prout, 1926. The taxon *captiosa* Vojnits therefore becomes a junior synonym of *E. robiginascens* Prout, 1926, **syn. nov.**

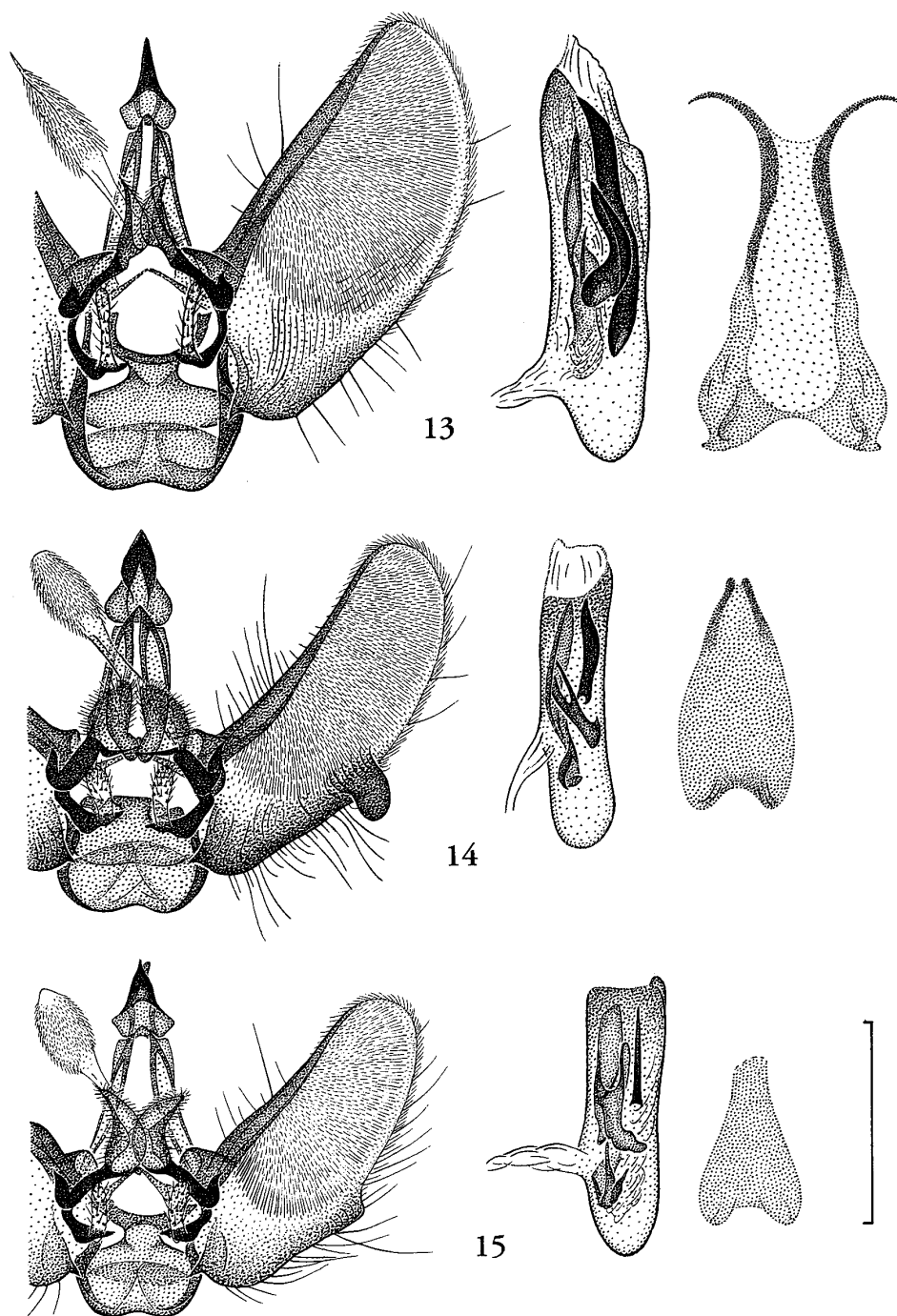


Figs 7-12. *Eupithecia* adults. 7. *E. citraria* sp. nov. 8. *E. russula* sp. nov. 9. *E. brunneilutea* sp. nov. 10. *E. luctuosa* sp. nov. 11. *E. apta* sp. nov. 12. *E. fortis* sp. nov.

***Eupithecia albimedia* Mironov & Galsworthy, sp. nov. (Fig. 3)**

Description. Wingspan 18-21 mm; forewing 10 mm. Forewing ground colour yellowish tan brown, with basal area as far as median line uniformly of this colour. Central part of median fascia white, with only a narrow border of ground colour on costa and inner margin. Median line, which forms border between brown and white areas, curving outwards round discal spot, then sharply inwards beneath discal spot, to a very acute angle on the underside of the cell, following which it curves outwards and then inwards to meet the inner margin at an obtuse angle. A darker brown double postmedian line, gently and regularly curved from the costa, ending somewhat before the inner margin, bordered on the outer side by a narrow extension of the white area. Terminal area uniformly of the ground colour. Discal spot prominent, black. Hindwing a dirty white, darkening a little towards the terminal area. Anal margin as far as cell mottled with pale brown, with incomplete double antemedian lines just visible.

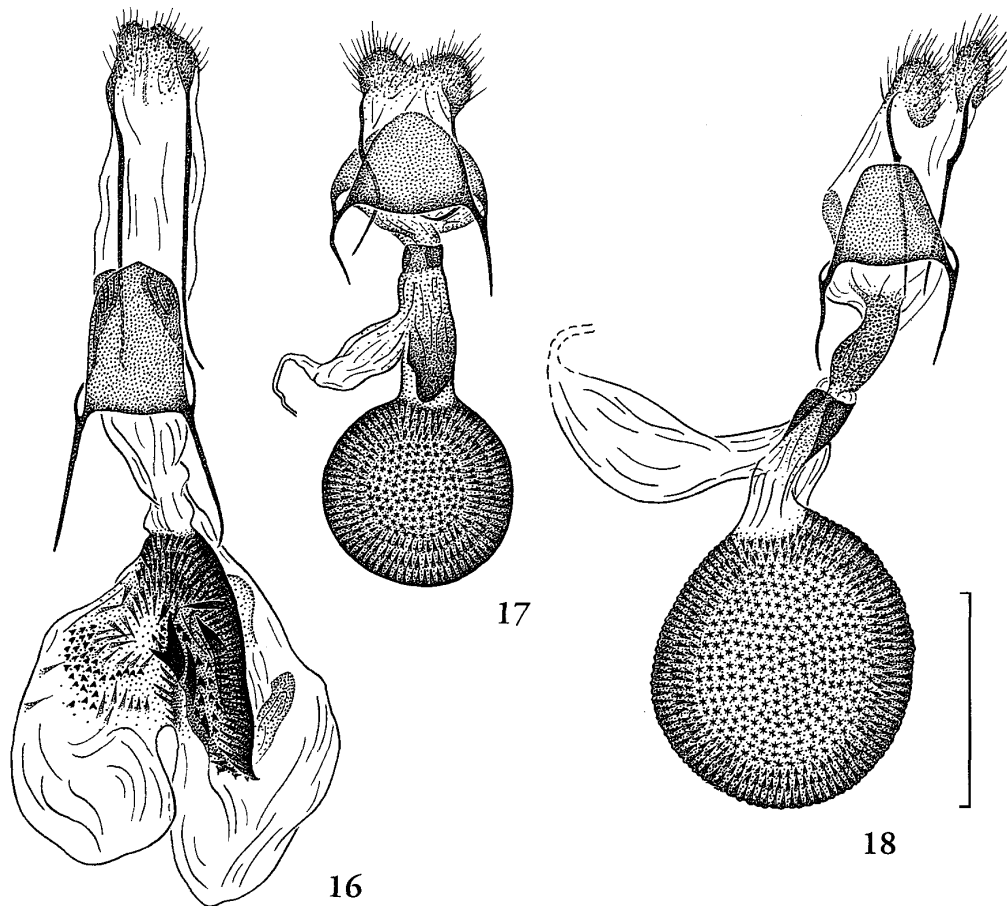
Male genitalia (Fig. 15). Uncus short, stout, biapical. Valve rather large, elongate, with small and blunt ventral process and rounded apex. Vinculum short and narrow, with very shallow medial hollow. Papillae on the anterior arms of labides elongate and narrow, completely covered with sparse setae. Aedeagus slim. Vesica armed with one long, thin,



Figs 13–15. Male genitalia of *Eupithecia* species (scale bar=1 mm; with sternite A8). 13. *E. amicula* sp. nov. 14. *E. honesta* sp. nov. 15. *E. albimedia* sp. nov.

straight and very slim horn-like cornutus, one large and broad H-shaped plate and one large irregular, “crumpled” plate near ductus ejaculatorius base. Sternite A8 peg-like, rather narrow.

Female genitalia (Fig. 18). Bursa copulatrix globular, completely covered with small spines. Ductus bursae membranous, elongate, over one half length of corpus bursae. Ductus seminalis large and broad, attached to ductus bursae near colliculum. Colliculum



Figs 16-18. Female genitalia of *Eupithecia* species (scale bar=1 mm). 16. *E. amacula* sp. nov. 17. *E. honesta* sp. nov. 18. *E. albimedia* sp. nov.

elongate and relatively narrow. Antrum lightly sclerotized. Tergite A8 trapezoid. Anterior and posterior apophyses thin; posterior apophyses with very short jags (spurs) near middle. Papillae anales rounded.

Range. Southwest China: Sichuan and Yunnan.

Similar species. This new species also belongs to the *lariciata* species-group, but is easily distinguished from other representatives of the group by the larger discal spot and extensive white in the centre of the forewing. In the genitalia, the smaller ventral process on the valve, the longer, slim, and straight horn-like cornutus on the vesica and the apically narrower sternite A8 in the male will distinguish *E. albimedia* sp. n. from *E. lariciata* with accuracy. The female genitalia of *E. albimedia* sp. n. are similar to the genitalia of *E. lariciata*, but can be easily distinguished by the shorter ductus bursae and narrow colliculum.

Holotype. ♂, Likiang [Lijiang], North Yunnan, 2. ix. 1935, H. Höne, De Laever slide no 152 (ZFMK). Paratypes. 2♂1♀, locality as holotype, respectively 13. viii. 1935, 14. viii. 1934 (ca 2,000 m), 29. viii. 1934, H. Höne, De Laever slides nos 295 and 143, and Vojnits slide 12238 (ZFMK); 1♀, Dukou, 2,150 m, 22. viii. 1980, coll Zhang Baolin, slide L-3102 (ZCAS).

Remarks. Unfortunately, the distal tip of sternite A8 in slide no 143 of De Laever (ZFMK)

is missing. The other slides (nos 152 and 295, De Laever, ZFMK) of the male genitalia of this species lack sternite A8 altogether and no 295 lacks the aedeagus as well.

***Eupithecia salubris* Mironov & Galsworthy, sp. nov.** (Fig. 4)

Description. Wingspan 14–16 mm; forewing: male: 8.5 mm, female 10 mm. Ground colour uniform pale brown, dotted in basal, costal, postmedian and terminal areas with darker scales. All transverse lines in darker brown, but very faint. A narrow, curved basal line. One postbasal and two antemedial lines, angled on Cu+M; a single median line passing through discal dot, strongly angled on Cu+M. A faint oblique postmedial, angled below costa. Fringes uniform pale brown. Hindwing uniform pale brown, dotted with darker scales along anal margin. Note: all specimens are rather worn: it is possible that fresh specimens would have clearer wing markings.

Male genitalia (Fig. 19). Uncus short, stout, probably biapical. Valve without ventral process; apex blunt; the long basal setae on the ventral margin are placed on short processes. Vinculum short and rather broad. Papillae on the anterior ends of labides elongate and narrow. Aedeagus very short and stout. Vesica armed with two horn-like cornuti (one hook-shaped, larger than the other) and one small irregular plate near ductus ejaculatorius base. Sternite A8 small, with two long, narrow, blunt rods; basal hollow shallow; apical hollow very deep, membranous.

Female genitalia (Fig. 22). Bursa copulatrix large, ovate, membranous with two large separate patches of elongate and slim spines, one in the middle of the corpus bursae and the other near the colliculum. Ductus seminalis absent in slide, but possibly attached to corpus bursae near colliculum. Colliculum rather short and narrow. Antrum membranous. Tergite A8 quadrate. Anterior and posterior apophyses short and thin. Papillae anales relatively small, short and of medium width.

Range. West China: Mountains of Shanxi and Shaanxi.

Similar species. Similar to the Chinese species *E. coniurata* Vojnits, 1979, but the distance between the antemedial and medial lines on the forewing is shorter than in *E. coniurata*. The new species is also distinguished from *coniurata* by the shorter and stouter uncus, the small processes carrying long setae on the ventral margin of the valve, the stouter hook-like cornuti on the vesica in the male genitalia, and by the shape of the bursa copulatrix and the disposition of spines in the corpus bursae in the female genitalia.

Holotype. ♂, Tapaishan [Dabaishan], Tsinling [Qinling], South Shaanxi, ca 1,700 m, 9. viii. 1936, H. Höne, De Laever slide no 287 (ZFMK). **Paratypes.** 1 ♀, locality as holotype, 9. ix. 1936, H. Höne, Vojnits slide no 12944; 1 ♂, Mianshan, Shanxi, Upper slopes ca 2,000 m, 8. viii. 1937, H. Höne, Vojnits slide no 13268 (ZFMK).

Remarks. The female specimen listed above was published by Vojnits (1981) as a paratype of *Eupithecia infecta* Vojnits. It is not however conspecific with the holotype male of that species, which belongs to the *lariciata* species-group.

***Eupithecia antiqua* Mironov & Galsworthy, sp. nov.** (Fig. 5)

Description. ♂. Wingspan 21 mm; forewing 13mm. Forewing broad, triangular, costa bowed close to base. Ground colour grey, all markings dark brown. A narrow, curved basal line. Postbasal line strongly angled close to costa, then continuing to meet inner margin at right angles. A double antemedial, curved near the costa. A median line, beginning as a

single crenellated line close to the costa, then sharply angled and continuing as a double line to the inner margin in two loops, with an acute angle pointing basad on the lower margin of the cell. Discal dot round, placed close to costal angle of median line. A double postmedian, angled sharply basad near the costa, and bordered on the inner side by dark markings on the veins. Terminal area shaded dark brown, crossed by a pale zigzag submarginal line. Fringes chequered grey and brown. Hindwing ground colour dirty white. Discal dot faint and small. Brownish median and postmedian lines present from anal margin to cell. Terminal area brown from anal margin to vein M_1 , with zigzag white submarginal line. Fringes chequered brown and white.

Male genitalia (Fig. 20). Uncus large, elongate and thick, possibly biapical. Valve large, without ventral process. Vinculum short and broad, trapezoid. Papillae on the anterior ends of labides of medium size, tapered, covered with sparse setae. Aedeagus large, thick and stout, shorter than length of valve. Vesica armed with two large horn-like cornuti, broadening at their midpoints, one slim and narrow U-shaped plate, and one large bowed and irregular plate near ductus ejaculatorius base. Sternite A8 two elongate and relatively broad arms with narrow, pointed, heavily sclerotized tips; basal hollow shallow; apical hollow very deep, membranous.

Female unknown.

Range. Southwest China: Yunnan.

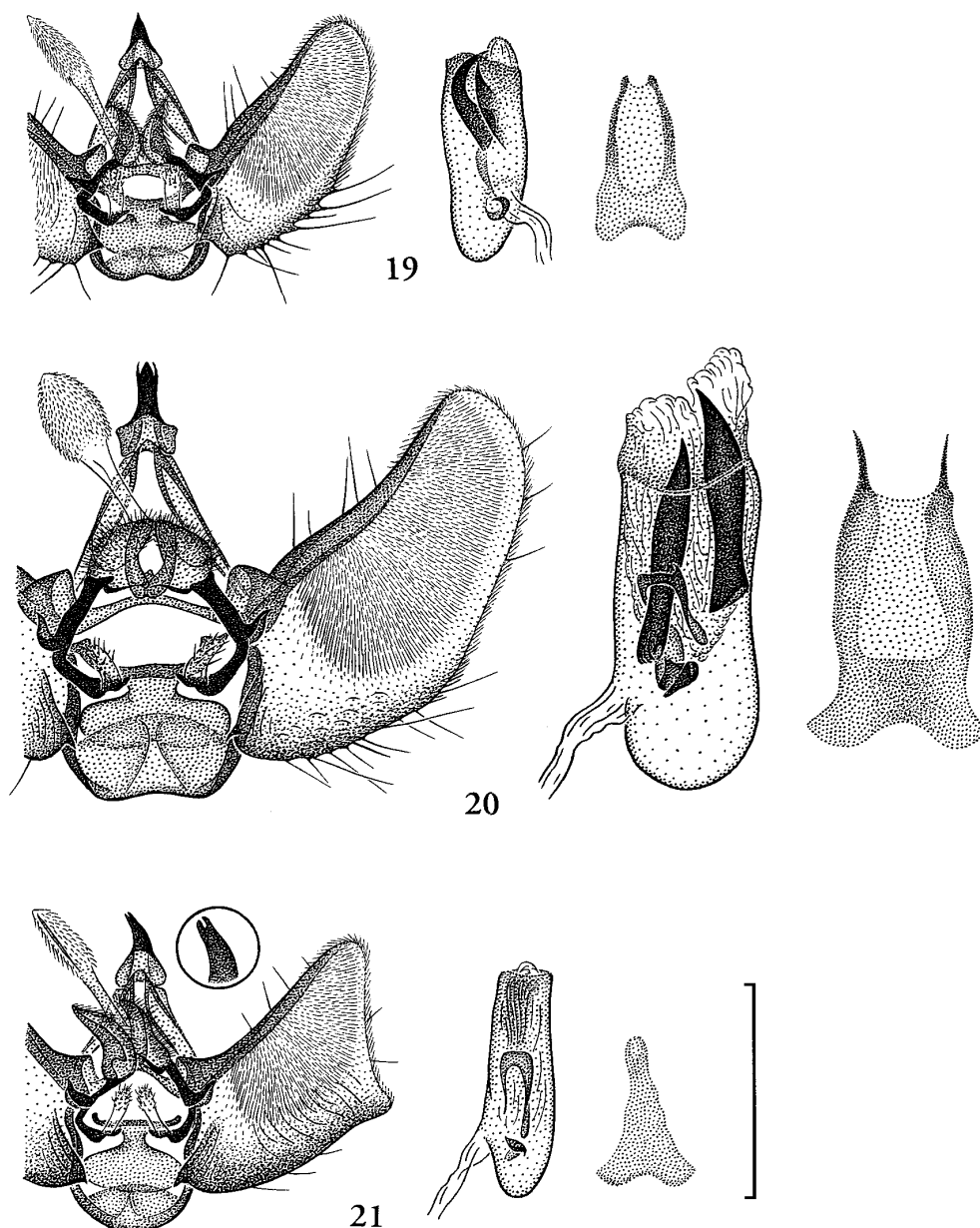
Similar species. Judging by the structure of the genitalia and the shape of sternite A8 in the male, this species may possibly belong to the *undata* species-group. The male genitalia are distinctive, and should be used for accurate determination. Externally this species is rather similar to the European *E. undata* (Freyer, 1840); however, the white wavy subterminal lines of the terminal areas of the forewings are less dentate and the hindwings are paler in the area from the costa to the centre than in *E. undata*.

Holotype. ♂, Likiang [Lijiang], Yunnan, 3. v. 1935, H. Höne, De Laever slide no 263 (ZFMK).

***Eupithecia tibetana* Mironov & Galsworthy, sp. nov. (Fig. 6)**

Description. Wingspan 20–23 mm; forewing 12 mm. Forewing broad, triangular, the costa uniformly bowed along its length. Ground colour pale brown. Basal area as far as median line darker brown, basal and antemedian lines present only as short oblique lines on the costa. Median line sharply angled near costa, showing below the angle only as a division between darker basal area of wing and paler median fascia. Discal dot an elongated streak, lying on the median line. Postmedian line present as a double line, the inner one consisting of dots on the veins, and the outer as a brown line, obtusely angled near the costa. Terminal area darker, similar in colour to basal area, crossed by traces of a pale submarginal line. Hindwing ground colour dirty brownish white, with a prominent discal spot. Full set of transverse lines present as blurred brown lines extending from the anal margin to the lower margin of the cell. Terminal line dark brown. Fringes of both wings plain pale brown, unchequered.

Male genitalia (Fig. 21). Uncus rather short, biapical. Valve short and broad, rather square, with straight costal margin, a blunt ventral process, somewhat asymmetrical, being more pronounced on the right valve, and a narrowly rounded apex; sacculus sclerotized. Vinculum short and narrow. Papillae on anterior ends of labides small, elongate and narrow. Aedeagus slim. Vesica armed with one thin U-shaped cornutus and a small irregular plate



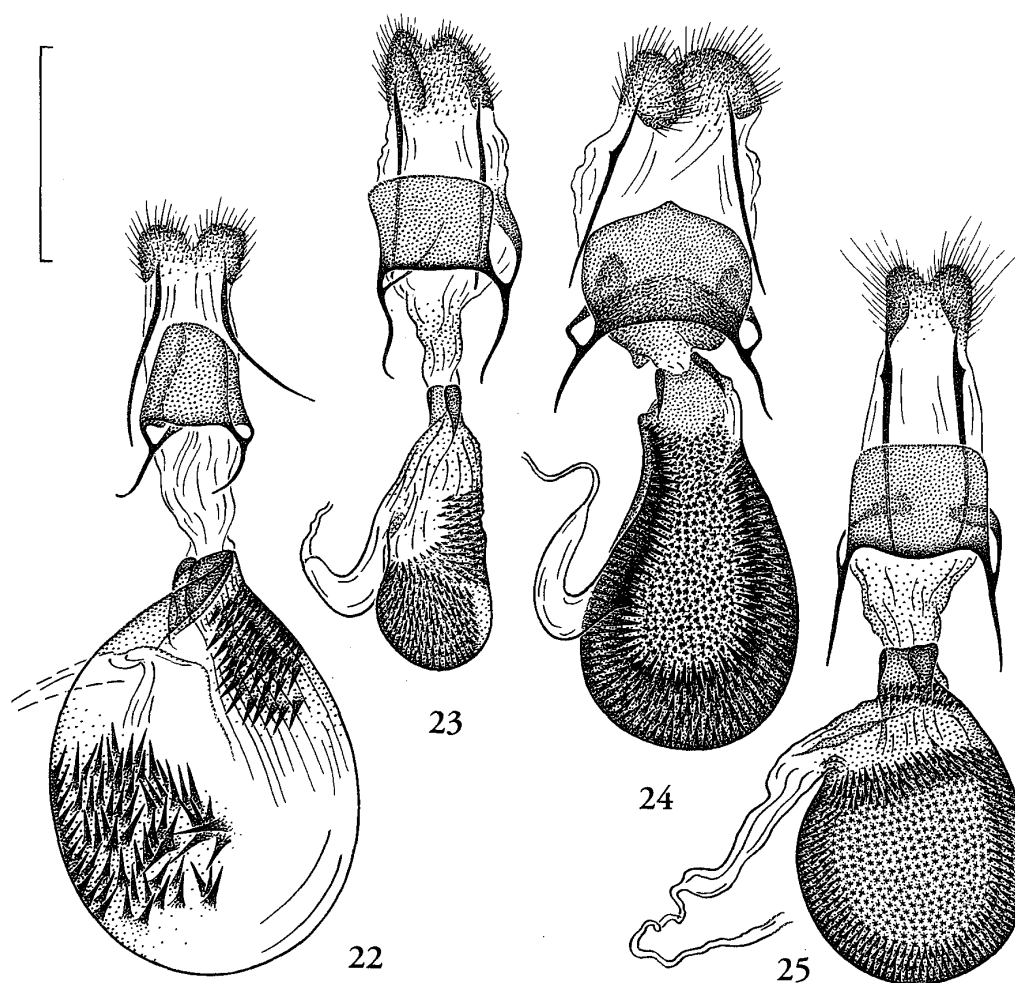
Figs 19–21. Male genitalia of *Eupithecia* species (scale bar=1 mm; with sternite A8; lateral view of uncus enlarged). 19. *E. salubris* sp. nov. 20. *E. antiqua* sp. nov. 21. *E. tibetana* sp. nov.

near ductus ejaculatorius base. Sternite A8 small, peg-shaped with a small membranous apical hollow.

Female genitalia (Fig. 23). Bursa copulatrix elongate, covered over about half its surface with small spines concentrated in the anterior portion, with a small area without spines near base on the left side. Ductus seminalis attached to middle of corpus bursae on the right side. Colliculum collar-like, relatively short and narrow. Antrum membranous. Anterior and posterior apophyses medium-sized, thin. Tergite A8 nearly quadrate. Papillae anales relatively large and broad, covered with short setae.

Range. Tibet.

Similar species. Similar to *E. pusillata* ([Denis & Schiffermüller], 1775) on the basis of



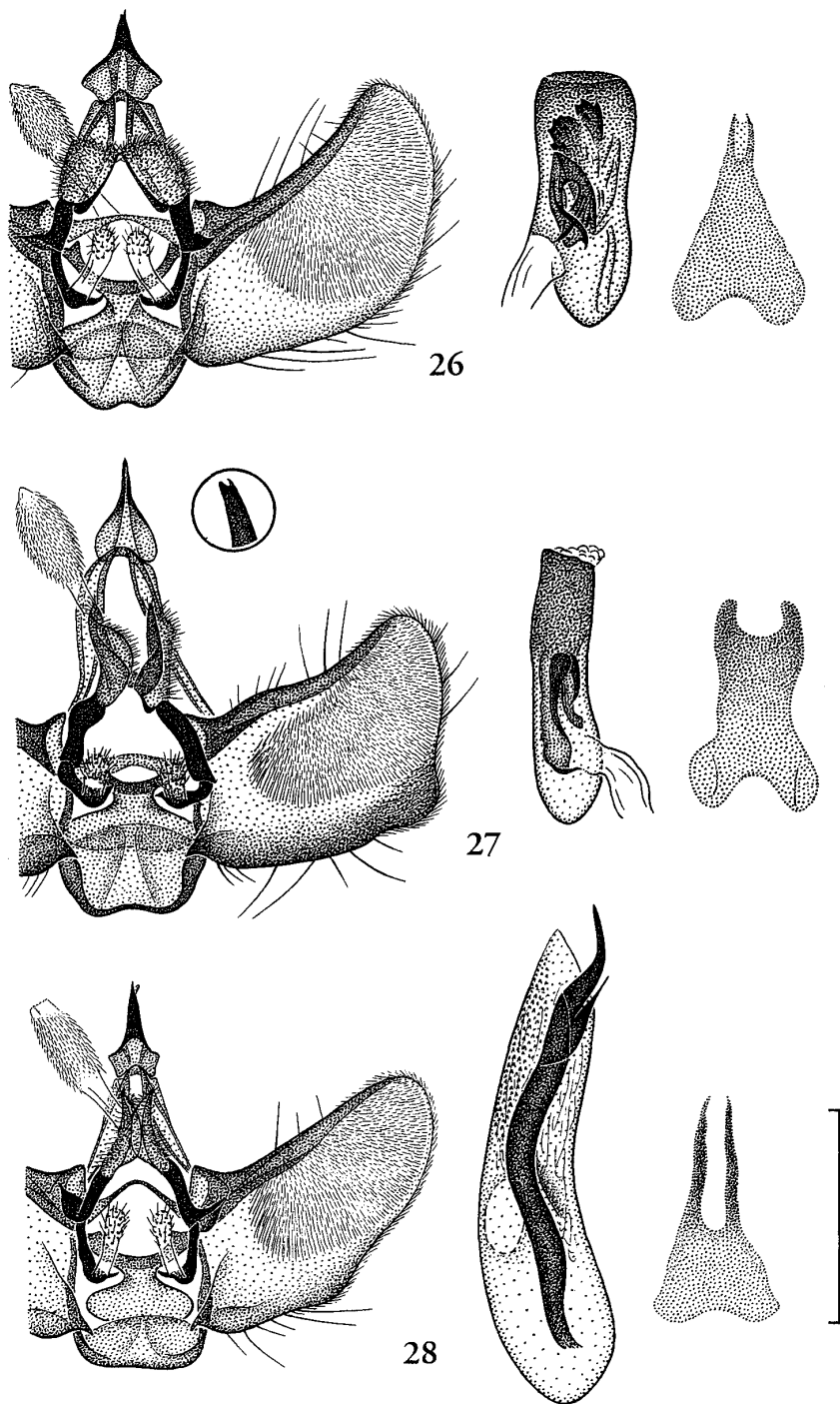
Figs 22–25. Female genitalia of *Eupithecia* species (scale bar=1 mm). 22. *E. salubris* sp. nov. 23. *E. tibetana* sp. nov. 24. *E. citraria* sp. nov. 25. *E. russula* sp. nov.

ground colour and pattern on the forewings, and the shapes of valve and sternite A8 in the male genitalia. However, the cornuti on the vesica in the male genitalia are similar to those of *E. subfuscata* (Haworth, 1809). The female genitalia are similar to those of *E. millefoliata* Rössler, 1866, but the bursa copulatrix is smaller and the apophyses longer than in that species. The male genitalia of the new species, especially the combination of shape of valve, cornuti on the vesica, and shape of sternite A8, are unlike those of any other known species, and can be used for determination with accuracy.

Holotype. ♂, Chaqiansangjiu, Tibet, 3,000 m, 25. vi. 1973, coll Huang Fusheng, slide L-3123 (ZCAS). Paratypes. 1 ♀, data as holotype, 3,100 m, 1. viii. 1973, slide L-2713; 1 ♀, Tibet, Pomi, Jiamu, 2,750 m, 24. ix. 1973, slide L-2912, both coll Huang Fusheng (ZCAS).

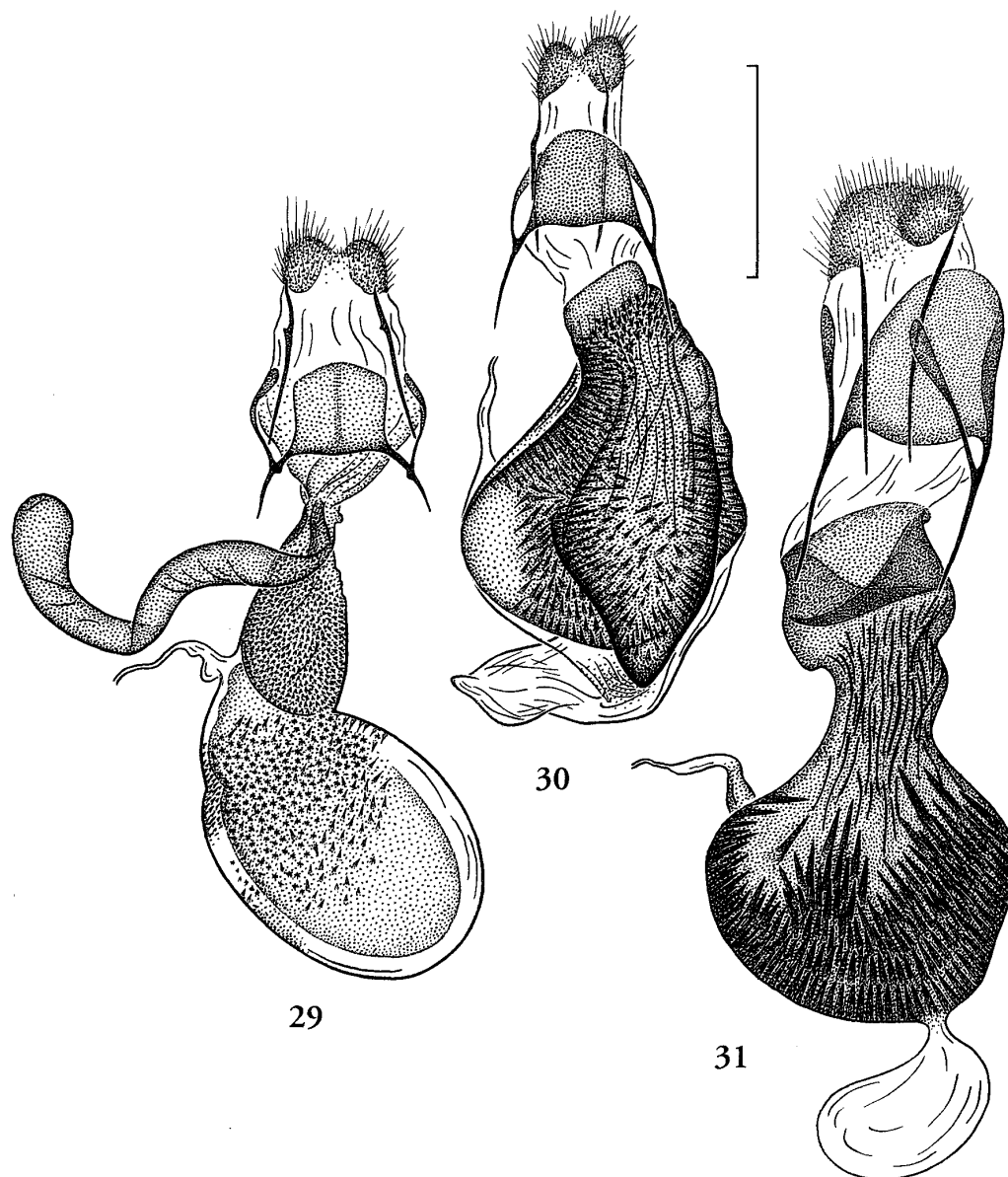
***Eupithecia citraria* Mironov & Galsworthy, sp. nov. (Fig. 7)**

Description. Wingspan 21.5 mm; forewing 14 mm. Forewing elongate, costa slightly bowed along entire length; ground colour a markedly reddish brown, transverse lines in



Figs 26–28. Male genitalia of *Eupithecia* species (scale bar=1 mm; with sternite A8; lateral view of uncus enlarged). 26. *E. citraria* sp. nov. 27. *E. brunneilutea* sp. nov. 28. *E. luctuosa* sp. nov.

purplish brown. An indistinct curved basal line, followed by a narrow, double antemedian, curving regularly across wing, but not angled. Postmedian almost straight, curving slightly around end of cell. Discal spot black, elongate, lower end touching the postmedian. A faintly paler fascia distad of the postmedian, most marked towards the costa. Terminal area with a comma-shaped dark subterminal spot, and a dark subterminal blotch between veins M_1 and M_2 . Terminal line dark brown. Fringes chequered brown and buff. Hindwing ground



Figs 29-31. Female genitalia of *Eupithecia* species (scale bar=1 mm). 29. *E. luctuosa* sp. nov. 30. *E. apta* sp. nov. 31. *E. fortis* sp. nov.

colour brownish white, with a small discal dot. A darker brown suffusion forming very vaguely the beginnings of transverse lines along the anal margin, and a fainter suffusion in the terminal area. Terminal line dark brown. Fringes dirty brownish white.

Male genitalia (Fig. 26). Uncus short and stout, biapical, with a large and broad base. Valve rather short and broad, slightly curved, without ventral process. Vinculum short, trapezoid, with a very shallow medial hollow. Papillae on the anterior arms of labides elongate and narrow, covered with sparse setae near apices. Aedeagus short and thick, tapered at anterior end. Vesica armed with two dentate cornuti (one longer than the other) and one large and broad V-shaped plate. Sternite A8 peg-like with broadened base, wavy lateral margins and two narrow apical rods.

Female genitalia (Fig. 24). Bursa copulatrix egg-shaped, densely covered over about four

fifths of its area with small uniform spines and with a separate patch of small spines in the short ductus bursae near the colliculum. Ductus seminalis attached to corpus bursae near colliculum from right side. Colliculum collar-like, of medium size and width. Antrum slightly sclerotized. Tergite A8 nearly quadrate. Anterior and posterior apophyses of medium length; posterior apophyses broadened near papillae anales, with very small spurs. Papillae anales rather elongate and narrow, covered with long setae.

Range. Southwest China: Known only from Lijiang, NW Yunnan.

Similar species. Similar externally to *E. subbrunneata* Dietze, 1904, but can usually be distinguished from it by the lighter ground colour, the smaller number of dark costal spots on the forewing, and the lighter hind wing. In spite of this external similarity, *E. citraria* sp. n. belongs to the *russeliata* species-group on the basis of the genitalia structure. It is most similar to *E. rubeni* Viidalepp, 1976 in this species-group, particularly in the rusty ground colour, but can be distinguished from it by the different pattern on the wings and the structure of the male and female genitalia. The shape of the valve is rather similar to that of the European species *E. immundata* (Lienig & Zeller, 1846). However, the combination of uncus, papillae on the anterior arms of the labides, the shape of sternite A8 in the male, and the substantially different female genitalia easily distinguish this species from all other known representatives of the *russeliata* group.

Holotype. ♂, Likiang [Lijiang], North Yunnan, 26. v. 1935, H. Höne, De Laever slide no 348, (ZFMK). Paratype. 1 ♀, Yulongshan, Lijiang, Yunnan, 28. vi. 1962, coll Song Shimei, slide no L-3023, (ZCAS).

***Eupithecia russula* Mironov & Galsworthy, sp. nov. (Fig. 8)**

Description. ♀. Wingspan 21 mm; forewing 13 mm. Forewing ground colour pale reddish brown, basal and median areas of wing suffused with dark brown scales, giving this area a darker less rufous appearance than the terminal area. Antemedian and median lines obscure or suppressed. Dark brown, slightly elongate, discal spot. A triple postmedian line, angled twice close to the costa, the inner two lines faint and strongly angled close to the discal spot, the outer stronger and thicker. Subterminal area almost unmarked, but with slight brownish terminal suffusion at apical one third and at tornus. Terminal line brown. Fringes chequered brown and cream. Hindwing ground colour white, with a very small discal dot. Anal margin to cell strongly suffused with brown. Terminal line brown. Fringes as forewing. Abdomen covered with light greyish brown scales with rusty tinge dorsally and covered with light ash-grey or whitish grey scales ventrally.

Female genitalia (Fig. 25). Bursa copulatrix globular, slightly elongate, sclerotized; completely covered with small spines on the ventral side and on the dorsal side other than the spineless medial part; the row of marginal spines bordering the unspined area is more strongly sclerotized than other spines on the dorsal side. Ductus bursae slightly broadened near colliculum and membranous on left side. Ductus seminalis incurved, attached to middle part of corpus bursae. Colliculum short and rather narrow. Antrum slightly sclerotized, with numerous pores. Tergite A8 relatively large and broad. Anterior and posterior apophyses short. Papillae anales short and wide.

Male unknown.

Range. Tibet.

Similar species. This species is rather similar externally to the European *E. cocciferata*

Millière, 1864 and *E. abbreviata* Stephens, 1831. The female genitalia of *E. russula* sp. n. can easily be separated from those of other *Eupithecia* species by the shape of the bursa copulatrix, the disposition of the spiniferous area, and the shape of tergite A8.

Holotype. ♀, Batang (Tibet), Yangtse Valley, ca 2,800 m, 13. v. 1936, H. Höne, Mironov slide no 507 (ZFMK).

Remarks. The unique holotype is somewhat worn: markings would probably be clearer on a fresh specimen.

***Eupithecia brunneilutea* Mironov & Galsworthy, sp. nov. (Fig. 9)**

Description. ♂. Wingspan 19–21 mm; forewing 10–11 mm. Forewing ground colour creamy white, with transverse markings dark brown. A single postbasal, and double antemedian line, not angled but very finely zigzag. Discal dot small, round. Median line curving from costa through discal dot, then angled abruptly towards inner margin, doubled below cell. Well-marked double postmedian line, curved round cell, and then running straight to inner margin. A strongly zigzag submarginal line. Costa, inner margin and terminal area suffused yellow, with some dark brown scales. Terminal line lacking. Fringes pale yellow. Hindwing ground colour as forewing, with a small, obscure discal dot. Basal, antemedian, median and double postmedian lines well marked to posterior margin of cell. A strongly zigzag subterminal line. Terminal area suffused yellow.

Male genitalia (Fig. 27). Uncus long, thin, biapical. Valve short and broad, with a sclerotized, broad and blunt ventral process; sacculus sclerotized. Vinculum broad, with shallow medial hollow. Labides short and thick. Papillae on anterior ends of labides also short and thick. Aedeagus slim, elongate and narrow. Vesica armed with one large U-shaped plate, which has one short and narrow end and other elongate and broad. Sternite A8 with prominent basal hollow; medially slightly narrower; its apical half broadened with two broad, sclerotized, slightly incurved and apically blunt lobes.

Female unknown.

Range. Southwest China: Yunnan province. Nepal.

Similar species. A handsome and very distinct species belonging to the *centaureata* group, which cannot be confused with any other known Chinese *Eupithecia*. It is related to the Chinese *E. exquisita* Vojnits, 1979, but appears to be most similar to the Central Asian *E. mekrana* Brandt, 1941. It can easily be distinguished from this species by the darker and more wavy transverse lines on all wings. The structure of the male genitalia and the shape of the eighth sternite of the male are typical of species from the *centaureata* group.

Holotype. ♂, Li-kiang [Lijiang], North Yunnan, 8. viii. 1934, H. Höne, Mironov slide no 508 (ZFMK). Paratypes. 1 ♂, label data as holotype (abdomen missing); 1 ♂, same locality, 14. viii. 1934, ca 3,000 m, H. Höne, Mironov slide no 509 (ZFMK); 1 ♂, Nepal, Annapurna Himal, valley of Kali Gandaki, near Ghasa, 2,080 m, 83° 39.5' E, 28° 36' N, 4. vi. 1996, László and Ronkay, collection of Gy. M. Laszlo, Budapest.

***Eupithecia luctuosa* Mironov & Galsworthy, sp. nov. (Fig. 10)**

Description. Wingspan 17 mm; forewing 11 mm. Forewing very broad and short, apex strongly rounded. Costa bowed along entire length. Ground colour mid brown. An indistinct curved basal line, just darker than ground colour. Broader antemedian, leaving

costa at right angle, curving gently inwards, then becoming double at posterior margin of cell, the distal part angled strongly outwards, then curving to meet inner margin at right angles. Discal spot dark brown, square or slightly elongate. A dark brown, double, sinuous median line, passing through the discal dot. A comparatively broad postmedian line, leaving costa at right angles, evenly curved around discal dot, then running almost straight to inner margin, bordered distally by a broad pale fascia. Terminal area dark brown, crossed by a faint sinuous submarginal line. Terminal line absent. Fringes brown, paler distally. Hindwing very rounded. Ground colour as forewing. A faint, but quite large, discal dot. A doubled slightly darker brown postmedial, bordered distally by a pale fascia. Terminal area dark brown. Terminal line absent. Fringes brown.

Male genitalia (Fig. 28). Uncus elongate, biapical. Valve rather short with a small, broad and blunt ventral process. Vinculum short, of medium width, trapezoid. Papillae on the anterior ends of labides long and narrow. Aedeagus large, rather thick and long, longer than length of valve. Vesica armed with one very long sinuate horn-like cornutus, one small horn-like cornutus and a small lightly sclerotized plate at the middle of the aedeagus. Sternite A8 large, with two sclerotized, long, narrow and pointed rods; basal hollow very shallow; apical hollow deep and narrow.

Female genitalia (Fig. 29). Bursa copulatrix large, ovate, inclined to the left side, covered with small spines in the middle part. Ductus bursae elongate, broad, tapered to colliculum, heavily sclerotized, covered with numerous multiple spines. Ductus seminalis short, thin, attached to corpus bursae near base of ductus bursae from right side. There is an elongate, sclerotized blind gut, deviating from the ductus bursae near the colliculum. Colliculum collar-like, short and narrow. Antrum slightly sclerotized. Tergite A8 square, with slightly prominent posterior margin and sclerotized anterior margin. Anterior and posterior apophyses relatively short and thin with short spurs. Papillae anales short and broad, rounded.

Range. Southeast China: Fujian.

Similar species. Judging by the presence of an elongate and sclerotized blind gut in the female genitalia, this species may be allied to *Eupithecia robiginascens* Prout, 1926, and the Taiwanese *E. flexicornuta* Inoue, 1988. However, in other respects the male and female genitalia are quite distinct from those two species. The adults of both the species are considerably longer winged than the present species. *E. luctuosa* sp. n. is a small species, which can easily be recognized and distinguished from other *Eupithecia* by its broad wings and gloomy blackish violet ground colour. Externally rather similar to dark specimens of *E. pygmaeata* (Hübner, 1799), but can be distinguished from this species by the larger discal dots and blackish violet ground colour on all wings.

Holotype. ♀, Kwangtseh-Fukien [Fujian], 4. x. 1937, De Laever slide no 167 (ZFMK). Paratype. 1 ♂, locality and date as holotype, De Laever slide no 35 (ZFMK).

***Eupithecia apta* Mironov & Galsworthy, sp. nov. (Fig. 11)**

Description (NB both known specimens are worn). ♀. Wingspan 17.5 mm; forewing 11 mm. Forewing triangular, costa slightly bowed towards apex. Ground colour pale yellow-brown. Discal spot dark brown, prominent, slightly elongate. Traces of an antemedial visible on holotype. Postmedian line well distal of discal spot, curving from costa parallel to the termen, then straightening to meet inner margin at right angle. Terminal area slightly darker. Hindwing slightly elongate, uniform pale yellow brown; discal dot darker brown,

elongate. Traces of antemedial, medial and postmedial lines running from anal margin to posterior margin of cell. Subterminal area slightly darker.

Female genitalia (Fig. 30). Bursa copulatrix broad at anterior end, tapered towards ductus, sclerotized, with a large prominent sclerotized diverticulum at the right side and a large prominent membranous diverticulum at base; almost completely covered with spines apart from small areas along left and right sides. Ductus bursae short and broad, completely covered with spines. Ductus seminalis short, thin, attached to middle of corpus bursae. Colliculum entire, short and broad. Tergite A8 trapezoid, with rounded posterior corners. Anterior and posterior apophyses thin: anterior apophyses relatively long, posterior rather short. Papillae anales small, short and rounded.

Male unknown.

Range. Southwest China: Yunnan.

Similar species. The species belongs to the *undata* group. It is externally similar to *E. consortaria* Leech, 1897, but easily distinguished from it by the structure of the female genitalia. The female genitalia of *E. consortaria* are larger and have very large spines in the corpus bursae, and a finer structure of the diverticulum at the base of the bursa copulatrix. The female genitalia of this species are similar to those of *E. undata* (Freyer, 1840) and *E. fennoscandica* Knaben, 1949. They are distinguished from the genitalia of these two species by the shape of the corpus bursae, the presence of a large prominent sclerotized diverticulum at the right side of the bursa copulatrix, and by shorter posterior apophyses.

Holotype. ♀, Li-kiang [Lijiang], Yunnan, 28. viii. 1934, H. Höne, Vojnits slide no 11467 (ZFMK). Paratype. 1 ♀, A-tun tse [Deqing], Yunnan, Obere höhe ca 4,500 m, 6. viii. 1936, H. Höne, Vojnits slide no 12478 (ZFMK).

Remarks. The holotype was originally published in Vojnits (1979a) as a female paratype of *Eupithecia inepta* Vojnits. It is not, however, conspecific with the male holotype of that species.

***Eupithecia fortis* Mironov & Galsworthy, sp. nov. (Fig. 12)**

Description. ♀. Wingspan 27 mm; forewing 15 mm. Forewing broad, elongated, costa bowed along entire length. Ground colour pale yellowish brown. A narrow brown basal line, bordered distally by a fascia slightly darker brown than the ground colour. Antemedian line brown, leaving costa obliquely, then acutely angled close to discal spot, continuing almost straight and doubled to meet inner margin at obtuse angle. Discal dot large, trapezoid, intense black, consisting of sharply raised scales. Postmedian line leaving costa at acute angle, touching distal edge of discal dot, and continuing almost straight to the inner margin. Area bounded by antemedian, postmedian and discal dot mostly filled with darker brown, forming a distinct triangular mark on the costa. Terminal area with three dark brown apical, subapical and tornal patches, and all veins picked out in dark brown. Terminal line dark brown. Fringes chequered light and dark brown. Hindwing ground colour grey-white, with discal dot well marked. Anal margin as far as cell suffused with dark brown scales, and terminal area with slightly paler brown. A pale postmedian fascia, and a pale sinuous submarginal line. Terminal line and fringes as forewing.

Female genitalia (Fig. 31). Bursa copulatrix large, pear-shaped, heavily sclerotized; covered with large, long spines over slightly less than one half of its anterior end, at which

there is a membranous diverticulum. Ductus bursae elongate, wide, with longitudinal striations but without spines. Ductus seminalis short and narrow, attached to the middle part of corpus bursae from left side. Colliculum large and broad, funnel-shaped. Antrum membranous. Tergite A8 large. Anterior and posterior apophyses of intermediate size; posterior apophyses slightly thinner than anterior apophyses. Papillae anales large, broad, covered with long setae.

Male unknown.

Range. Southwest China: Yunnan.

Similar species. This species belongs to the *lanceata* group. It is externally very similar to the Japanese *E. takao* Inoue, 1955. However, the female genitalia are very distinctive, and unlikely to be confused with the genitalia of any other *Eupithecia* species. Particular points are the shape of the bursa copulatrix, the disposition of spines, the presence of a membranous diverticulum near the base of the corpus bursae and the large and broad funnel-like colliculum.

Holotype. ♀, Li-kiang [Lijiang], Yunnan, 17. ix. 1935, H. Höne, De Laever slide no 77 (ZFMK).

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摘 要

中国のカバナミシヤク属 (I) (V. MIRONOV · A. C. GALSWORTHY · 薛 大勇)

中国の *Eupithecia* 属に関しては, Vojnits による多数の論文 (過去 30 年間に 114 新種 4 新亜種が記載されている) があるが, その全容については未解明の部分が多く残されている。

筆者らは Alexander Koenig 博物館 (ボン) の Höne コレクション, およびロンドン自然史博物館, 中国科学院動物研究所などに所蔵されている本属の標本を調査し, 多数の新種を見い出した。本報ではそれらのうち以下の12新種を記載した。 *E. amicula* Mironov & Galsworthy (四川, 雲南, 陝西), *E. honesta* Mironov & Galsworthy (雲南), *E. albimedia* Mironov & Galsworthy (四川, 雲南), *E. salubris* Mironov & Galsworthy (山西, 陝西), *E. antiqua* Mironov & Galsworthy (雲南), *E. tibetana* Mironov & Galsworthy (チベット), *E. citraria* Mironov & Galsworthy (雲南), *E. russula* Mironov & Galsworthy (チベット), *E. brunneilutea* Mironov & Galsworthy (雲南, ネパール), *E. luctuosa* Mironov & Galsworthy (福建), *E. apta* Mironov & Galsworthy (雲南), *E. fortis* Mironov & Galsworthy (雲南)。

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